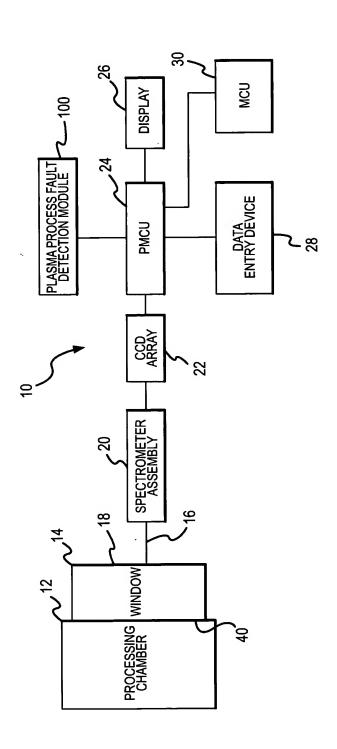Serial No.: 10/658,984   Sheet 1 of 8
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Analysis "
Applicant: Jahns et al.
Docket No.: 44500-00342
Attorney: Robert B. Berube   Tel: (303) 338-0997

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FIG. 1

PLASMA PROCESS FAULT DETECTION MODULE 100

DISPLAY 26

MCU 30

PMCU 24

DATA ENTRY DEVICE 28

CCD ARRAY 22

SPECTROMETER ASSEMBLY 20

10

WINDOW

PROCESSING CHAMBER

12 14 18 16 40

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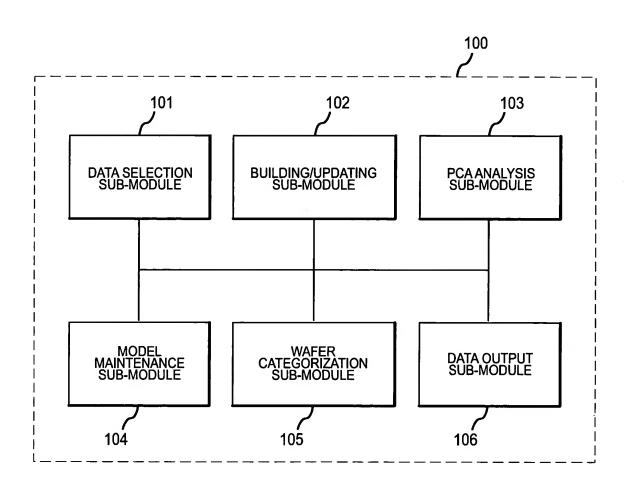
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FIG. 2

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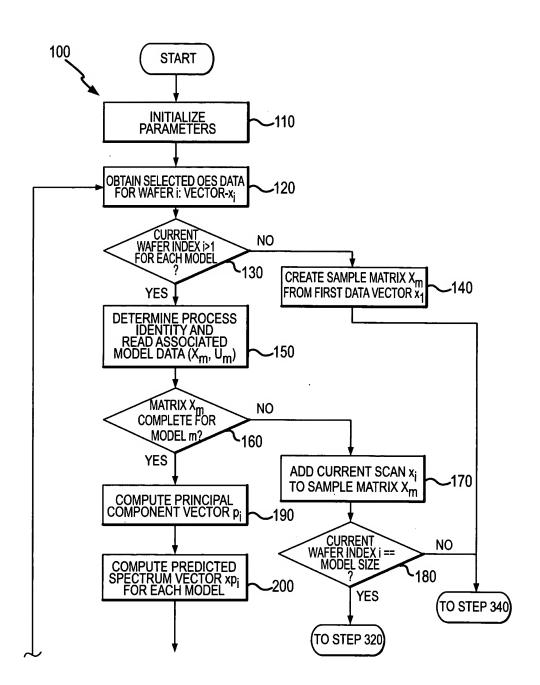FIG. 3A

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COMPUTE RESIDUAL SPECTRUM
VECTOR r_i FOR EACH MODEL — 210

CALCULATE STANDARD
DEVIATION σ_i OF r_i
FOR EACH MODEL — 220

NORMALIZE STANDARD
DEVIATION σ_i TO OBTAIN
$\sigma norm_i$ FOR EACH MODEL — 230

CATEGORIZE WAFER i BASED
ON $\sigma norm_i$ FOR EACH
DYNAMIC MODEL — 240

FIG. 3B

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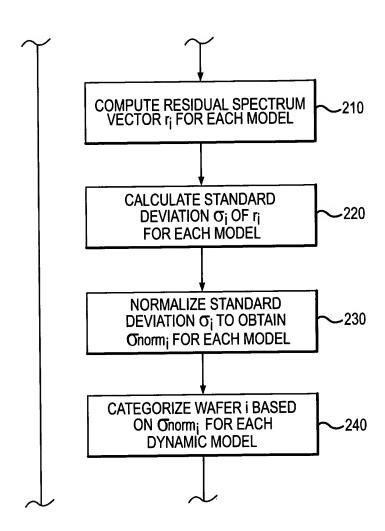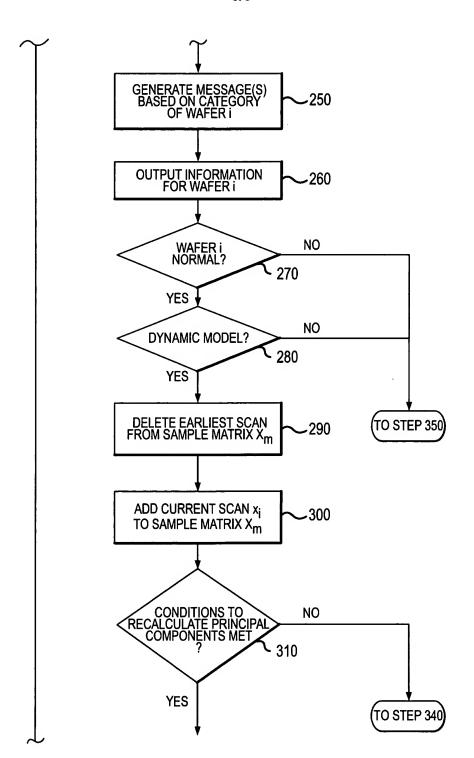Attorney: Robert B. Berube   Tel: (303) 338-0997

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GENERATE MESSAGE(S)
BASED ON CATEGORY
OF WAFER i — 250

OUTPUT INFORMATION
FOR WAFER i — 260

WAFER i
NORMAL? — 270
NO
YES

DYNAMIC MODEL? — 280
NO
YES

DELETE EARLIEST SCAN
FROM SAMPLE MATRIX X_m — 290

TO STEP 350

ADD CURRENT SCAN x_i
TO SAMPLE MATRIX X_m — 300

CONDITIONS TO
RECALCULATE PRINCIPAL
COMPONENTS MET
? — 310
NO
YES

TO STEP 340

FIG. 3C

PERFORM SVD ON X_m, OBTAIN SINGULAR VECTORS U_m — 320

FROM STEP 180 (YES CONDITION)

REDUCE SINGULAR VECTORS U_m TO PRINCIPAL SET OF SINGULAR VECTORS — 330

FROM STEP 140, 180, OR 310 (NO CONDITION)

SAVE MODEL DATA TO FILES — 340

FROM STEP 270 OR 280 (NO CONDITION)

PROCESS NEXT WAFER: $i = i + 1$ — 350

FIG. 3D

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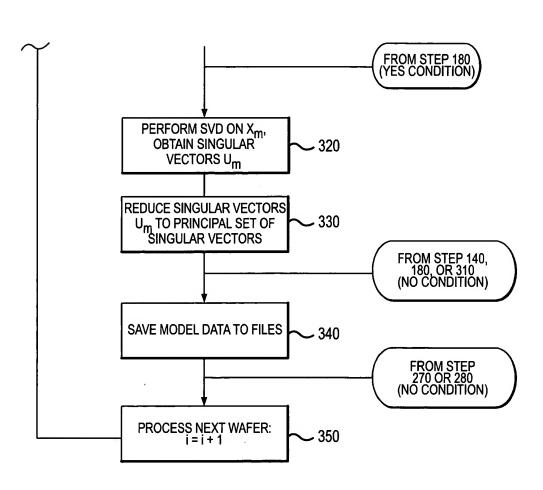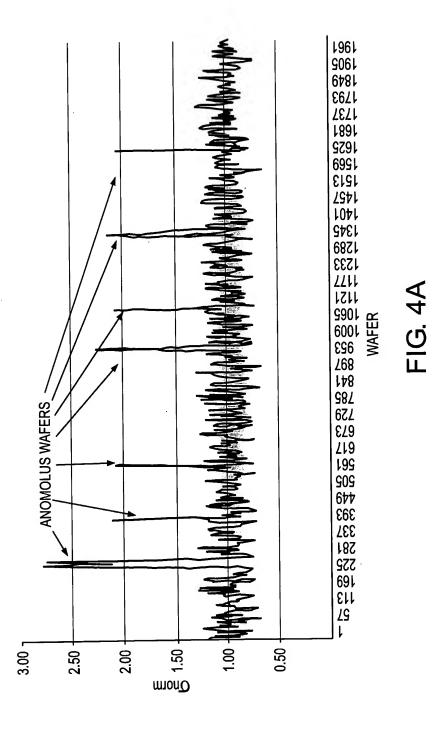Attorney: Robert B. Berube   Tel: (303) 338-0997

FIG. 4A

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ANOMOLUS WAFERS

FIG. 4B